WST2

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Cover photo: *Ever's Bridge, Mason County, Washington.*

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Due to increasing printing and mailing costs, plans are being made to shift mail distribution of the WST2 Newsletter to electronic distribution via internet listserv. The newsletter has been available electronically for four years, but the majority of distribution is paper copies through U.S. Postal Service.

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Contents

WSDOT Team Tames Slippery Slope on SR 530

By Dave Chesson, WSDOT Communications

Every winter WSDOT anticipates wet and often times dangerous weather. Our maintenance crews are hyper-sensitive to the most subtle changes in the roads they drive and maintain on a daily basis. February 2006 was no exception as maintenance crews were first to notice that State Route 530 was shifting and cracking near the town of Oso. The roadway was threatening to slip off the hillside.

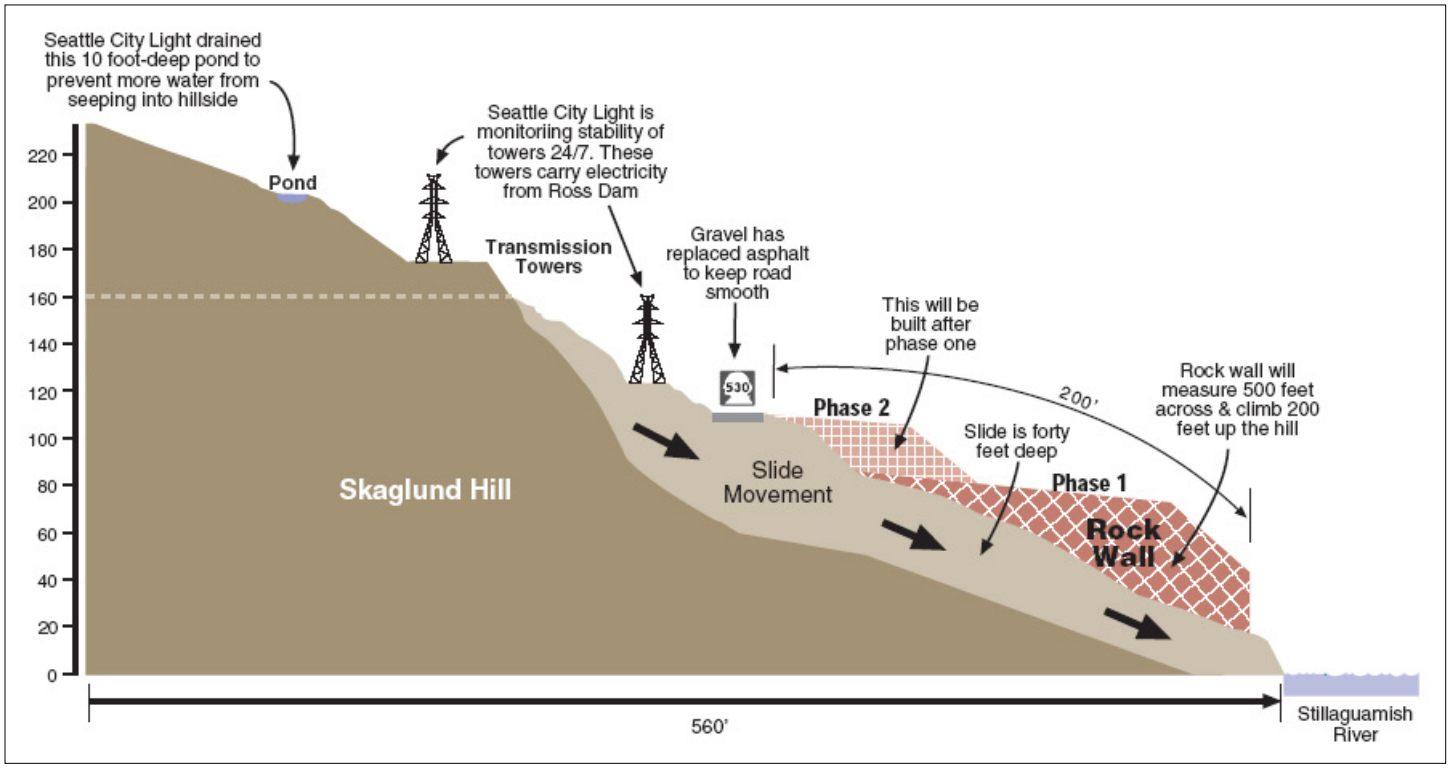
The SR 530 Slide Repair project is a prime example of team work at its finest. Not only was there the potential for injury, but SR 530 is the only connection between I-5 and the many communities east of Hazel, including Darrington. The shortest detour would have been 100 miles. WSDOT was quick to throw staff into high gear and work as a team, moving quickly and efficiently to assess the problem, enact emergency plans, save the road, and protect drivers.

When the problem was first reported in early February, WSDOT crews quickly set up equipment to monitor the slide's movement, called in environmental, geotechnical and engineering staff, and began running scenarios of possible solutions. Over 125 people took part in the project.

Time was not on WSDOT's side, as weather continued to dump buckets of rain and the road continued to move.

"The fast-track schedule was the greatest challenge," said Kevin Tobin, Design Team Leader. "The design team created a set of contract plans within one week. Under normal circumstances it takes up to a year. The emergency nature of the project and the cooperation with other agencies allowed us to take several short-cuts along the way."

WSDOT maintenance crews monitored the site 24 hours a day, ready to shut down the highway at a moments notice. They worked to keep the road open by paving



Pacific Road and Bridge crews working for WSDOT will use over 100,000 cubic yards of rock to build a rockwall that will prevent Skaglund Hill from sliding.

over the cracking and sinking road with cold patch almost daily. They also used 400 tons of hot asphalt to smooth the roadway just to keep it passable by commuters and commercial truck traffic. Other crews began by drilling thirty 150- to 350-foot drain holes horizontally into the hillside to help drain water and relieve the pressure.

Engineers agreed on a plan to stop the slide from moving toward the river and taking the road with it. By building a massive rock wall below the road, they believed the back pressure would stop the slide. In June, WSDOT crews finished hauling 100,000 yards of rock, gravel and soil to stabilize the hillside, enough to fill 10,000 dump trucks.

The buttress is 500 feet wide, stretches 200 feet up the hill and is up to 30 feet deep in many places.

From every corner of WSDOT, staff worked tirelessly to forge a plan to stop the massive slide. Though crews eventually removed the pavement when voids developed under the surface, and replaced it with gravel, the road was never closed to traffic. Managers credit the quick response and tireless dedication of staff as major factors that saved the hillside from taking out the road.

"A lot of people dropped their already packed schedules to help pull this one off" said WSDOT Engineering Manager Marco Foster. "We did everything we could to design this project, find a contractor, and begin work as quickly as possible. In the end, we succeeded!"

▲

This drill is used to poke holes into the slide. Crews come back through with pipes and insert drains that go as deep as 350 feet. These drains pull the water out of the hillside thereby making the hillside less likely to slip. Thirty of these drains have been installed. March 2006

Look closely and you can see small white drain pipes poking out of the third layer. These drains pull water out of the hillside and send it toward the river. May 2006

Crews prepare the slope for more layers of material that will make up the massive rock wall. April 2006

Workers built this gutter along the top wall to pull the water away from the slide area and direct it toward the Stillaguamish River. June 2006

Urban Stormwater Retrofit

Improving Safety, Reducing Stormwater, and Enhancing Community Character

By Paula Reeves, Local Planning Liaison, WSDOT Highways & Local Programs Division

Increased stormwater flows due to growth and development may be an asset to your community after all. New research conducted at both the national level and at WSDOT point to opportunities to reduce negative impacts of stormwater using a combination of regional and site level techniques to prevent, treat, and store runoff and associated pollutants. Many of these practices use low-impact development methods, such as rain gardens, bio-retention areas, and grass swales. Others go further by changing site-design practices to maximize existing infrastructure by focusing development, reducing parking spaces, narrowing streets, and eliminating cul-de-sacs.

Stormwater 101

Impervious surface areas restrict infiltration and alter the natural hydrologic cycle. Conventional stormwater management practices create additional problems as they wash rapid and irregular flows of polluted stormwater into waterways. Stormwater runoff from urban areas, particularly surrounding Puget Sound, has contributed to the degradation of water quality in Washington's waters.

Conventional stormwater conveyance systems concentrate water runoff in detention ponds and sewer systems, until it is discharged through an outfall back into the natural hydrologic system. Unlike in the pre-development cycle, the discharged water is released far from its point of inception, and is altered in terms of its quantity, speed, and quality. Lack of infiltration causes groundwater depletion, and collected pollutants are not filtered before being released into receiving waters. Water pollution resultant from stormwater outfalls is increasing with development, and is currently one of the major challenges faced in the effort to reclaim the biological integrity of Washington's waters.

Stormwater and Transportation

According to the Washington State Office of Financial Management, Washington is growing by an estimated 300 people per day. Growth in traffic and vehicle miles traveled is expected to continue to outpace population growth. Many communities are asking where and how they can accommodate this growth while maintaining or improving their water resources.

New urban development, as well as revitalization of existing urban development, can restore ecosystem functioning by recreating the natural hydrologic cycle. Innovations in stormwater management, such as low-impact development, allow for new development to have fewer impacts to natural systems than conventional practices. Additionally, existing urban development can be retrofitted using similar practices to dramatically lessen its historic hydrologic disruptiveness.

Urban vegetation, landscaped stormwater infiltration areas, and green riparian corridors can form a network of hydraulic controls, improve traffic flow, and more effectively manage traffic on the roadway. If both regional and site level techniques are used, they can not only restore natural hydrologic functioning, but also provide air purification, improve traffic safety and calm traffic, enhance aesthetic character, instill civic pride, and generally improve the image of urban areas

Resources

US EPA, Protecting Water Resources with Higher Density Development
http://www.epa.gov/smartgrowth/pdf/protect_water_higher_density.pdf

Low Impact Development Center
http://www.lowimpactdevelopment.org/home.htm

Puget Sound Action Team – Technical Guidance and Grants
http://www.psat.wa.gov/Programs/LID.htm

A Program for Children and Communities in Washington

By Charlotte Claybrooke, Safe Routes to School Coordinator, WSDOT Highways & Local Programs Division

The Safe Routes to School Program is about increasing the number of children walking and biking to school safely. It is a program to provide children a safe, healthy alternative to riding the bus or being driven to school. There are three elements to Safe Routes to School — engineering, education, and enforcement efforts.

The engineering improvements reduce potential pedestrian and bicycle conflicts with motor vehicle traffic; reduce traffic volume around schools; and/or establish safer and fully accessible crossings, walkways, trails, or bikeways. They include items such as sidewalk improvements, traffic calming, pedestrian and bicycle crossing improvements, on-street bicycle facilities, off-street bicycle and pedestrian facilities, and secure bicycle parking facilities. Education efforts teach children about bicycling and walking safety skills, the health benefits of walking and biking, the impact to the environment, the broad range of transportation choices, and events and activities utilized to encourage walking and biking to school safely. Enforcement efforts help to ensure that traffic laws are obeyed (including enforcement of speeds, yielding to pedestrians in crossings, and proper walking and bicycling behaviors) and/or initiate community enforcement activities.

Citizens and local and state governments make Safe Routes to School successful by joining together to examine conditions around schools and conducting projects and activities that improve safety and reduce traffic and air pollution in the vicinity of schools. As a result, these programs make bicycling and walking to school a safer and more appealing transportation choice, thus encouraging healthy communities and an active lifestyle from an early age.

How Does a Community Start a Safe Routes to School Program?

Successful Safe Routes programs involve partnerships. Parents, children, neighborhood groups, schools, law enforcement officers, community leaders, and transportation and public health professionals help identify the issues and solutions.

Special Needs of Children

Safe Routes to School programs should take into consideration the developmental limitations of children. They have narrower side vision, are less able to determine the direction of sound, and have a limited capacity to anticipate vehicle speed. Due to their smaller size, it is more difficult for them to see vehicles and be seen by motorists. Children also have limited reasoning and judgment abilities. They are less focused than adults and have less experience navigating safely to their destinations. Engineering, education, and enforcement techniques can be used to address these differences and accommodate this special population. Community partnerships are the key to identifying solutions and opportunities that will best meet the needs of the children.

Some Design Considerations

- Identify school walk/bike routes for children within a two-mile radius of the school.
- Mark roads adjacent to schools as *School Zones* in accordance with RCW 46.61.440: "A county or city may create a school speed zone in which it is unlawful to operate a vehicle at a speed in excess of twenty miles per hour. The school zone may extend 300 ft. from the border of the school property or 300 ft. in either direction from a marked crossing."
- Provide school crossings, allowing one crossing for each block (300 to 600 ft. spacing) and as appropriate along the school walk/bike routes. Guidance for marking or signalizing school crossings can be found in the WSDOT *Design Manual*, Figure 1025-5.
- Provide pedestrian facilities. A generalized method of assessing the need for, and adequacy of, pedestrian facilities can be found in the WSDOT *Design Manual*, Figure 1025-4.

Continued on page 39.

2006 Awards of Excellence Winners

Outstanding Local Projects Chosen for Awards by WSDOT's Highways and Local Programs and FHWA

The cities of Prosser, Snohomish, and Brewster, as well as Skagit County have been chosen for Awards of Excellence by the Washington State Department of Transportation and Federal Highway Administration.

The awards recognize the "best of the best" of local agency transportation projects that are funded by FHWA. The award categories were Best City Project, Best County Project, Best Special Project, and Director's Award.

Best City Project

City of Prosser, Wine Country Road Project

Wine Country Road extends through the entire length of the City of Prosser and serves as a major arterial for the growing Prosser area and its food processing industries. The 3.5 mile long corridor suffered from traffic congestion and delay, limited vertical clearance, and needed pedestrian and bicycle improvements. The roadway reconstruction improves pedestrian, bicycle and motorist safety, and encourages economic development. The completed project provides three vehicle lanes, an additional Yakima River bridge crossing, a reconstructed railroad structure, two traffic signals, continuous curbs and sidewalks, new roadway and pedestrian lighting, as well as a new storm drainage system that helps to improve water quality. The successful partnership for this project included the City of Prosser, Benton County, the Federal Highway Administration, WSDOT, the Freight Mobility Strategic Investment Board, and the Transportation Improvement Board.

The WSDOT contact for this project is Roger Arms, South Central Region Local Programs Engineer, (509) 577-1780.

Best County Project

Skagit County, Main Street Reconstruction Project

This multiple agency partnership between the Town of Concrete, Skagit County, the Federal Highway Administration, WSDOT, Transportation Improvement Board, and the residents and businesses of Concrete provided much safer conditions for all modes of transportation. The project involved total reconstruction of Main Street, including a new stormwater drainage system; removal of overhead utility lines and poles; extensive installation of sidewalks, street lighting, and landscaping; and improved access off of SR 20. Despite uncovering numerous conditions along the old street that required additional engineering and construction work, the project remained within budget and on time.

The WSDOT contact for this project is Ed Conyers, Northwest Region Local Programs Engineer, (206) 440-4734.

2006 Awards of Excellence Winners

Best Special Project

City of Snohomish, Riverfront Trail Project

The Snohomish Riverfront Trail includes a 350 foot long concrete pedestrian bridge, constructed atop steel piles and girders. Approximately one third complete, the trail will be one mile long when finished. This project unifies a series of small parks and street-ends along the city's southern border into a single waterfront destination. The project improves ADA and other public access to shorelines, protects wildlife habitat, water quality and bank stability, provides a safe community space, and adds economic value to the Snohomish National Historic District. It is an important link in the growing network of state and regional trails. Results from a local survey indicated that 47 percent of the local citizens expected to use the trail at least once or twice per week.

The WSDOT contact for this project is Ed Conyers, Northwest Region Local Programs Engineer, (206) 440-4734.

Director's Award

City of Brewster, Main Avenue Reconstruction

This Main Avenue Reconstruction project revitalized Brewster's downtown appeal and improved access and functionality to the entire transportation system. The project provided bulb-out curbs with ADA ramps, decorative street lighting, a new storm drain system, and full sidewalks. Three public meetings were held with local citizens and business owners, soliciting input regarding public needs and minimizing business and traffic disruptions. WSDOT was able to obtain additional funding to widen the shoulder of SR-173 for pedestrian safety. Even with the inherent challenges of downtown construction, this project was completed within the original budget.

The WSDOT contact for this project is Paul Mahre, North Central Region Local Programs Engineer, (509) 667-3090.

Pavements and Studded Tire Damage

WSDOT – State Materials Laboratory

By Linda Pierce, State Pavements Engineer, and
Tom Baker, State Materials Engineer.

Introduction

To date, damage caused by studded tires has been difficult to quantify; however, with improved technology it is now possible to measure the amount of damage studded tires cause on state highways. Direct measurements of this damage can be made on concrete pavements and accurate estimates for hot mix asphalt pavements will be possible in the near future. Measurements on concrete pavements indicate current damage due to studded tires to be $18.2 million. Damage estimates for hot mix asphalt pavements cannot yet be determined due to software limitations, but estimates will be available by late 2006 or early 2007.

Studded Tire Pavement Damage

Studded tires damage hot mix asphalt and concrete pavements, wearing away the pavement and eventually forming ruts on the pavement surface. This type of rut damage is called “raveling.” Raveling on concrete pavements only comes from studded tire wear; raveling on hot mix asphalt comes primarily from studded tire wear with a lesser portion coming from general tire wear.

Concrete Pavement Studded Tire Damage

The carbide steel in the studs is many times stronger than the surface of the concrete pavement and over time the studs grind away at the pavement's surface. Eventually ruts form and when the ruts become severe, pavement rehabilitation is required to restore a smooth, even surface.

New, Undamaged Concrete Pavement: Photo 1 shows a newly constructed concrete pavement on southbound I-5 in the vicinity of 317th in Federal Way. Construction occurred in the summer of 2005 and at the time of the photo, this pavement had received no vehicle traffic. The surface treatment on this concrete pavement was produced by dragging Astroturf (Photo 2) over the unhardened concrete surface, providing a skid resistant surface, as well as a quieter pavement texture. This section will be studied more closely over the next several years to determine long-term durability, skid resistance and noise reduction qualities.

Photo 1. New concrete pavement on southbound I-5 in the vicinity of 317th
Constructed 2005, not yet under traffic.

Photo 2. Texturing concrete pavement with an Astroturf Drag

Eight year old concrete pavement, Washington State: Photo 3 shows a concrete pavement constructed in 1995 on state route (SR) 395 in the vicinity of Ritzville, just south of Interstate (I) 90. At the time of this photo, this pavement had been in service for eight years (photo taken in 2003). The current average annual daily traffic on this route is approximately 6,800 vehicles. This pavement had a surface treatment that is referred to as "transverse tining". Transverse tining is created by pulling a rake across the wet concrete which forms shallow grooves on the surface, similar to the texture of corduroy (Photo 4). These shallow grooves, or tining, increase the pavement skid resistance. Photo 3 shows that the tining has been completely removed from the wheel paths, due to studded tires, while the tining outside of the wheel path is intact at the edges of the pavement.

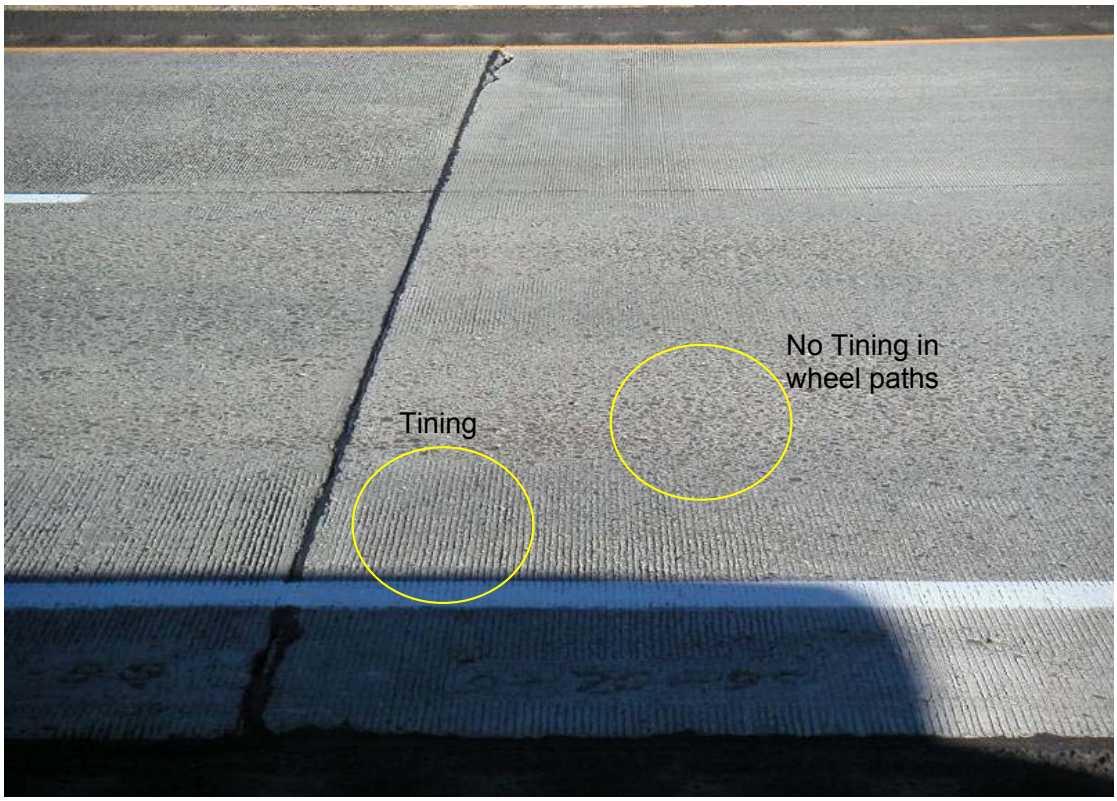


Photo 3. Concrete pavement on SR-395 south of I-90.
ADT: 6,800 vehicles
Pavement age: Eight years

Photo 4. Transverse tining of fresh concrete pavement.

16 year old concrete pavement, Texas: Photo 5 shows a 16 year old concrete pavement constructed in 1989 on I-45 in Houston, Texas (photo taken in 2005). Although the state of Texas allows studded tires, their mild climate results in almost zero studded tire usage, and consequently, no studded tire damage. This roadway carries approximately 178,000 vehicles per day, yet after 16 years the original tining marks are clearly present and unworn. Contrast Photo 5 with Photo 6, which is a similarly aged concrete pavement in the Seattle area with less traffic. The Texas highway has one and a half times the traffic volume of I-90, yet the Washington State pavement clearly shows wear while the Texas highway is in like new condition.

Photo 5. Concrete pavement on I-45 in Houston, TX.
ADT: 178,000 vehicles
Pavement Age: 16 years

16 year old concrete pavement, Washington: Photo 6 shows a 16 year old concrete pavement constructed in 1989 on I-90 in Seattle in the vicinity of Rainier Avenue (photo taken in 2005). This pavement has an average annual daily traffic of 120,000 vehicles.

Photo 6. Concrete pavement on I-90 in Seattle (Rainier Avenue).
ADT: 120,000 vehicles
Pavement Age: 16 years

In the 1970's the state of Minnesota was able to successfully ban the use of studded tires. Photo 7 (taken in 2005) shows the surface of a concrete pavement on I-94 in Minneapolis. This pavement was constructed in 1977 and currently carries an average annual daily traffic of 130,000 vehicles.

Photo 7. Concrete pavement on I-94 in Minneapolis, MN.
ADT: 130,000 vehicles
Pavement Age: 28 years

28 year old concrete pavement, Washington: Photo 8 shows a 28 year old concrete pavement constructed in 1977 on I-90 near Preston-Fall City. The average annual daily traffic on this section of pavement is 50,000 vehicles.

Photo 8. Concrete pavement on I-90 near Preston Fall City.
ADT: 50,000 vehicles
Pavement Age: 28 years

34 year old concrete pavement, California: Photo 9 shows a concrete pavement on SR-101 in Ukiah, California. This pavement was constructed in 1967 (photo taken in 2001). Like Texas, California allows studded tires; however, the mild California climate also results in negligible studded tire usage. Contrast this photo with the damage seen in Photo 10. The current average annual daily traffic on SR-101 in Ukiah is approximately 26,000 vehicles.

Photo 9. Concrete pavement on State Route 101 in Ukiah, CA.
ADT: 26,000 vehicles
Pavement Age: 34 years

34 year old concrete pavement, Washington: Photo 10 shows a 34 year old concrete pavement constructed in 1967 on I-5 in Seattle in the vicinity of Boeing Field (photo taken 2005). The average annual daily traffic on this section of pavement is 204,000 vehicles.

Photo 10. Concrete pavement on I-5 near Boeing Field.
ADT: 204,000 vehicles
Pavement Age: 34 years

40 year old concrete pavement, Washington State: Photo 11 illustrates the concrete pavement surface on I-5, in the vicinity of the Tacoma Dome. WSDOT constructed this pavement 40 years ago, in 1965 (photo taken 2005). This section of I-5 has a current average annual daily traffic of 194,000 vehicles. Studded tires have worn away the top surface of the concrete, exposing the large rock below. The worn areas are lower than the rest of the pavement, forming ruts that tend to pond water, creating safety concerns. Severe ruts must be addressed through pavement rehabilitation. The wear is more prevalent in the wheel paths than at the pavement edges and center of the lane.

Photo 11. Concrete pavement on I-5 near the Tacoma Dome.
ADT: 194,000 vehicles
Pavement Age: 40 years

48 year old concrete pavement, Washington State: Photo 12 shows the concrete pavement surface on I-90 in Spokane, vicinity of Altamont Street that was constructed 48 years ago, in 1958. This section of I-90 has an average annual daily traffic of 100,000 vehicles. What is interesting to note on this pavement section is that in 1995 WSDOT conducted a rehabilitation project to diamond grind the existing surface to remove studded tire damage, 11 years later the studded tire wear continues to develop and is visibly noticeable (photo taken 2006). This photo also shows all three lanes on this highway section. The bottom of the photo is the far right lane and the top portion of the photo shows the far left lane. Another characteristic that is typical of studded tire wear is that on multi-lane facilities (3 or more lanes in one direction) the middle lane generally has the most severe studded tire damage (i.e. the location of the majority of the passenger vehicle traffic).

Photo 12. Concrete pavement on I-90 in Spokane.
ADT: 100,000 vehicles
Pavement Age: 48 years

The following table illustrates the amount of wear due to studded tires that is present on the concrete pavements of Washington State compared to comparable pavements (in age) to those in California, Texas and Minnesota.

Table 1. Summary of State Concrete Pavement Performance.

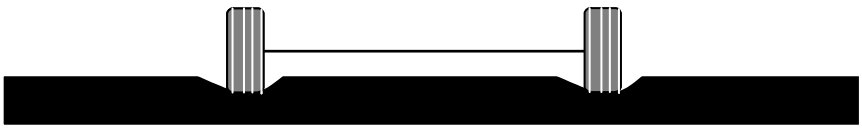
State	Roadway	Age	Daily Two Way Traffic Volume	Average Depth of Wear (mm)
Washington	SR-395 Ritzville	11 years	6,800	1
Texas	I-45 Houston	16 years	178,000	0
Washington	I-90 Seattle – Rainier Avenue	16 years	120,000	2
Minnesota	I-84 Minneapolis	28 years	130,000	0
Washington	I-90 Preston-Fall City	28 years	50,000	7
California	SR-101 Ukiah	34 years	26,000	0
Washington	I-5 Seattle – Boeing Field	34 years	204,000	5
Washington	I-5 Tacoma	40 years	194,000	7
Washington	I-90 Spokane	48 years	100,000	7

Hot Mix Asphalt Pavement Studded Tire Damage

Damage to the surface of hot mix asphalt pavements comes in two main forms: pavement rutting and pavement raveling. While both rutting and raveling produce the same results, the source of the damage is quite different. Hot mix asphalt pavement rutting (also referred to as “shoving” or “plastic flow”) comes from trucks: the pavement is insufficient to support the heavy truck weight and deforms under the load. Hot mix asphalt pavement raveling comes from tire wear and especially from studded tire wear. The studded tires dig into the pavement and pick out the small aggregate, eventually forming a rut.

Although both rutting and raveling form ruts, they are quite distinct in cause and appearance. Figure 1 illustrates the difference between rutting (plastic flow caused by trucks) and raveling (caused by studded tires mounted on passenger vehicles).

a. HMA rutting due to trucks



b. HMA raveling due to studded tires

Figure 1. Schematic of rutting (plastic flow) versus raveling.

A spectacular, but not typical, hot mix asphalt pavement rutting failure is shown in Photo 13: too much liquid asphalt in this pavement lead to the rapid rutting and shoving seen in the photo. Please note that this is a rare failure on a very small section of a truck weigh scale; the majority of hot mix asphalt pavement rutting is not this severe.

Photo 13. Spectacular, but not typical, hot mix asphalt pavement rutting (I-90 Port of Entry Weigh Scale, Spokane vicinity).

Hot mix asphalt pavement raveling due to studded tires is quite different in appearance (Photo 14). Studs grind the surface of the hot mix asphalt pavement, wearing a groove into the roadway. In Photo 14, note that the dual wheel width of the semi truck exceeds the width of the studded tire groove (or rut), while the car wheels of the vehicle shown in the background lay directly within the wear pattern. The dynamics of studded tire action include three phases; as the studded tire moves over the pavement, there are "spikes" in force at the beginning and at the end of contact. During these spikes, energy is transferred to the pavement in the form of scratching. Between these spikes, the studs have a "punching" action that breaks up aggregate and picks out the pavement surface.

Photo 14. Wear due to studded tires on a hot mix asphalt pavement (I-90 in the vicinity of the Idaho Border).

Photo 15 shows a close-up of an open-graded hot mix asphalt pavement that has been damaged by studded tires. This pavement was originally placed in 1992 and was replaced three years later due to the significant rut caused by studded tires (approximately 1-½ inches deep).

Photo 15. Studded tires raveling on hot mix asphalt pavement on I-90 vicinity of Idaho border.

WSDOT Methodology for Evaluating Pavement Damage Due to Studded Tires

New technology and equipment have provided the opportunity to accurately measure studded tire damage on state highways. Previously, ruts were measured using a system composed of three lasers: one laser near each wheel of the measurement van and one in the center of the lane. Though this system provides a good measure of the rut depth, accurate measurement of the maximum rut depth was highly dependent on the location of the vehicle within the lane of travel. Now the rut/wear depth measurements are collected with the use of an "INO Laser Rut Measurement System (LRMS)." The INO LRMS, manufactured by the National Optics Institute of Quebec, Canada, employs two laser line sources that measure the entire lane width. The INO laser measures the deformations of the pavement surface at ⅛ inch intervals (over 1280 measurement points per 12 foot lane) allowing for a highly accurate measure of rutting/wear.

The INO LRMS system (Photo 16 displays the INO LRMS mounted on the pavement condition van) is used in conjunction with the Washington State Pavement Management System (WSPMS) to evaluate the pavement condition on all state highways. WSDOT measures the pavement condition (cracking, rutting and roughness) of every state highway, every year. On two lane highways, the most heavily traveled direction is measured and on multi-lane highways the most heavily traveled lane in both directions is measured. In all, WSDOT measures and evaluates the pavement condition on over 7,000 centerline miles (approximately 10,000 lane miles) of highway every year. The pavement condition van (Photo 16), travels at highway speeds and collects the rutting data using the INO system, collects data that relates to the roughness of the roadway, as well as collecting high-resolution digital images for determining the amount of pavement cracking and patching.

Photo 16. High speed WSPMS van and schematic of rut/wear depth determination.

Photo 17. WSDOT pavement condition van.

Once the rut measurements are collected, they are analyzed to determine the maximum rut/wear depth, the location of the maximum rut/wear and the width of rut/wear in each wheel path. Figure 2 and Photo 18 show the studded tire wear on a concrete pavement.

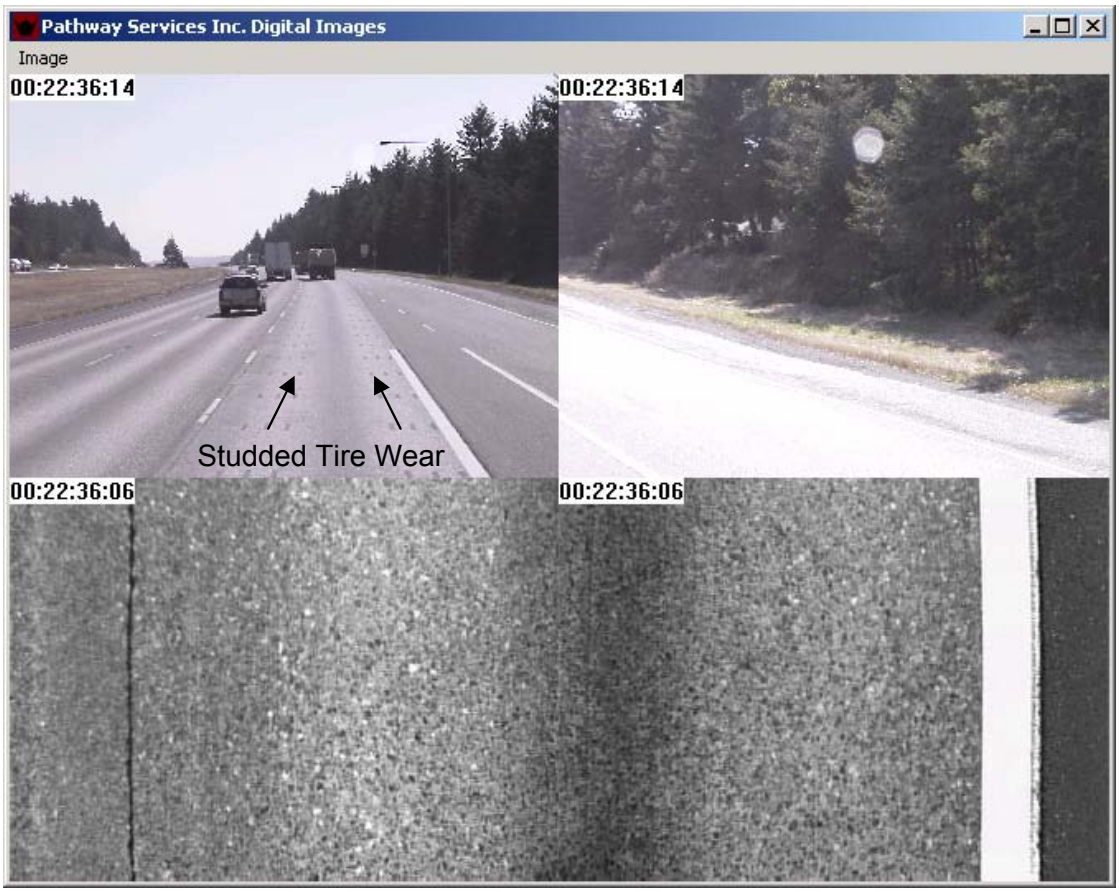


Photo 18. Pavement view in location of studded tire wear (I-5, northbound, milepost 112.23, Lacey vicinity, concrete pavement).

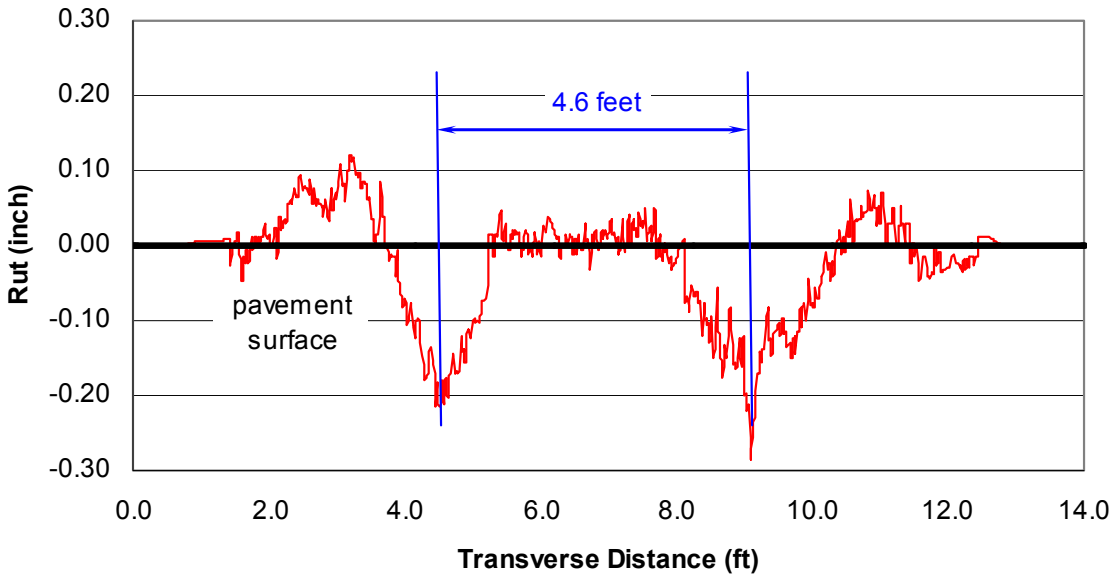


Figure 2. Transverse profile in an area of studded tire wear (I-5, northbound, milepost 112.23, Lacey vicinity, concrete pavement).

Figure 3 and Photo 19, show rutting on hot mix asphalt pavement.

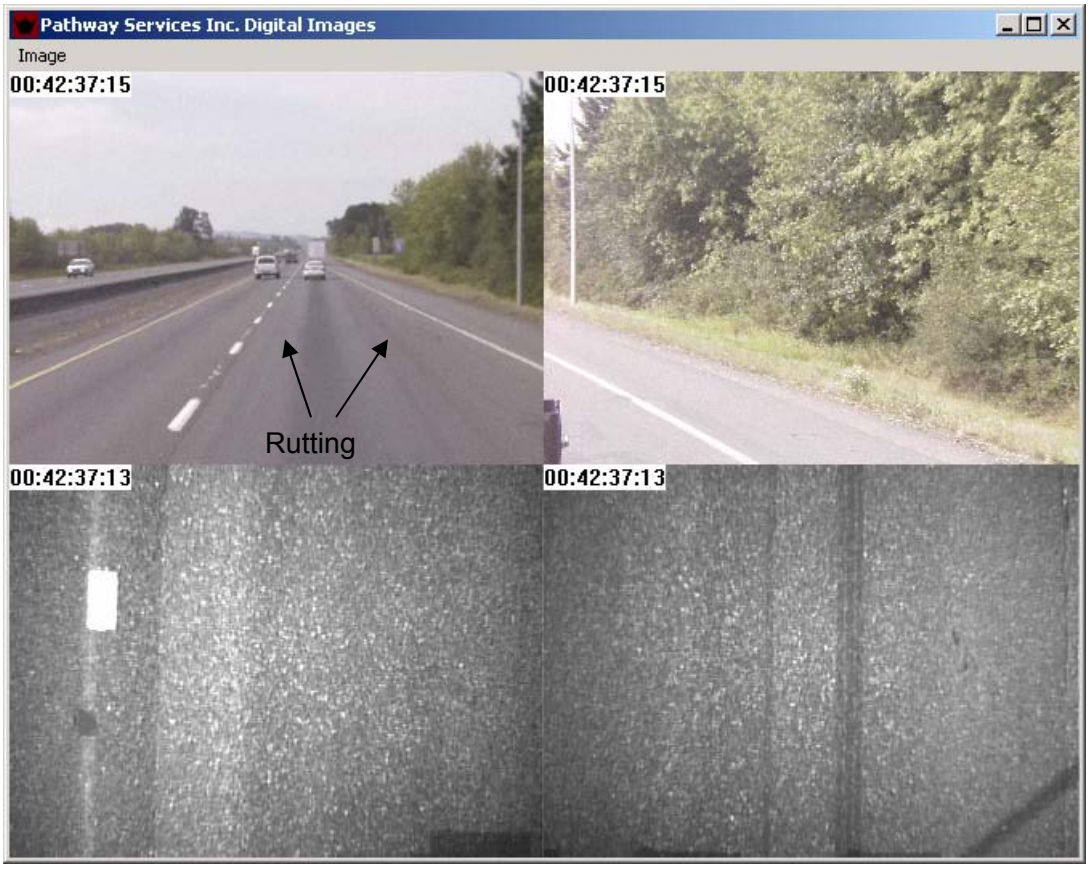


Photo 19. Pavement view in location of rutting (I-5, southbound, milepost 63.00, Toledo vicinity, hot mix asphalt pavement).

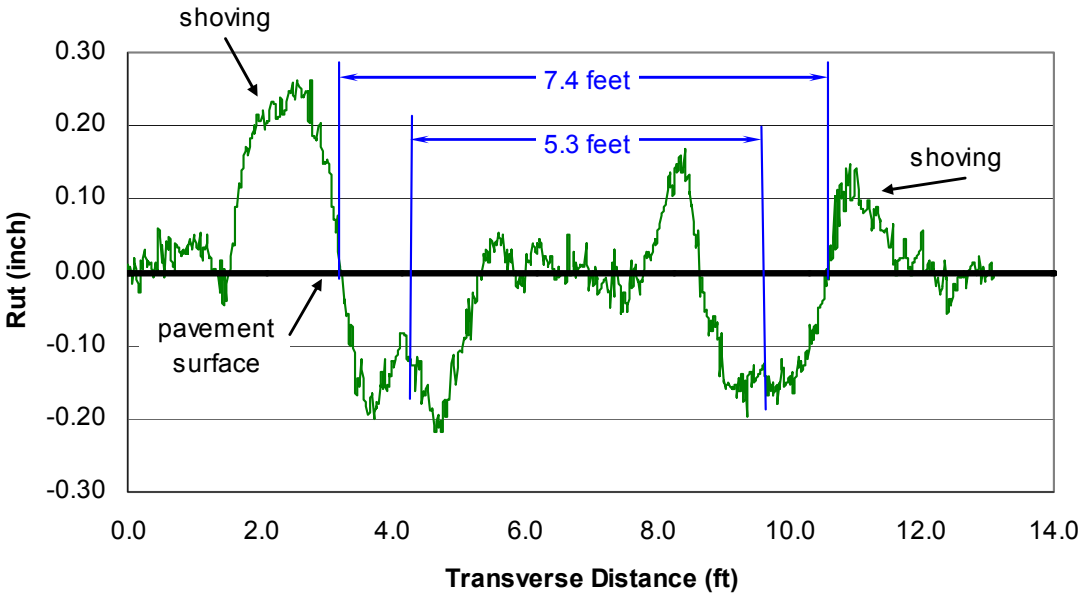


Figure 3. Transverse profile in location of rutting (I-5, southbound, milepost 63.00, Toledo vicinity, hot mix asphalt pavement).

The profiles above are exaggerated on the vertical scale, compared to the horizontal scale, but they provide a clear picture of the amount of wear or rutting. The example on concrete pavement wear is entirely due to studded tires and shows a loss of material from the pavement. The example on hot mix asphalt pavement ruts are from shoving (or plastic flow) where the pavement has been physically deformed by heavy truck traffic.

Once the rutting/wear data has been collected, the amount of damage due to studded tires can be determined. On concrete pavements all of the wear damage can be attributed to studded tires; if all lane miles of concrete pavements are measured, then the extent of the studded tire damage can be determined. For hot mix asphalt pavements the situation is more complicated, in that shoving (or plastic flow) rutting needs to be distinguished from raveling. The current software used with the INO system cannot separate out these two types of damage to the surface of hot mix asphalt pavements. We are working with the software vendor to have the software revised so that we can determine the amount of studded tire damage on hot mix asphalt pavements. We hope to have this software revision sometime in 2006.

Analysis Considerations

1. The annual pavement condition survey is carried out only on one lane in simple two-way highways and one lane in each direction, generally the outside lane, on multi-lane and divided highways. On highways with hot mix asphalt pavement and three or more lanes per direction, it is often the second and/or third lane from the right that appears to have predominantly studded tire wear and unfortunately, this is currently not the lane where the annual pavement condition survey is collected. For hot mix asphalt pavements, the outside lane evaluation has to be used to estimate the amount of studded tire wear on inside lanes. This could probably be accomplished by assuming a passenger car lane distribution factor (i.e., determine the amount of studded tire wear in the survey lane and then relate this amount of wear to the adjacent lanes that have more passenger car traffic).
2. For hot mix asphalt pavements on multi-lane and divided highways, the outside lanes where data is collected may have a combination of studded tire wear and rutting due to trucks. Whether the studded tire wear and rutting can be separately identified from the transverse profile has not yet been evaluated. If it is not possible to separate them, assumptions have to be made to prorate the amount of rutting/wear to each of the failure modes.
3. The INO LRMS is a new technology and has not been perfected with respect to acquiring 100 percent of the data 100 percent of the time, resulting in missing data for some of the roadway sections. These are identified in INO LRMS data acquisition and these can be excluded from the analysis. There are sufficient roadway sections with complete data for the proposed analysis.

Proposed Analysis Methodology

For concrete pavements, the maximum wear depth will be evaluated at approximately 0.1-mile interval for all lanes. The wear on PCCP is entirely attributed to studded tires. The cost of the damage to pavement will be evaluated as the amount of grinding required to remove the wear when it reaches a threshold for corrective action.

Results of Concrete Pavement Analysis

During 2004, as part of a concrete pavement rehabilitation study, WSDOT evaluated all lanes of concrete pavement on the state highway system. Table 2 illustrates the total number of concrete pavement lane miles according to the amount of measured studded tire damage.

Table 2. Summary of studded tire wear on concrete pavements.

Rut Depth (mm)	Number of Lane Miles
2 – 4	285
4 – 6	507
6 – 8	374
8 – 10	200
10 – 12	135
12 – 14	60
14 – 16	24
16 – 18	12
18 – 20	3
Total	1600
Number of lane miles with more than 10mm rutting	**234**

WSDOT's criterion for pavement rehabilitation due to pavement rutting/wear is 10 mm (~0.40 inches). Of the 1600 lane miles of concrete pavement, 234 lane miles exceed the threshold for rutting and need some type of rehabilitation. On concrete pavements, the primary methodology for removing pavement wear (if no other pavement distress is evident) is to diamond grind the pavement surface. The average cost for diamond grinding is approximately $90,000 per lane mile (this includes all construction costs, including traffic control, mobilization, etc).

Concrete pavement rehabilitation projects already programmed for other types of pavement distress overlap with these 234 lane-miles. If we are already going to rehabilitate a section of highway for other reasons (usually due to faulted pavement or structural damage), then we must remove these from the studded tire damage analysis. There are 32 lane-miles of planned rehabilitation; removing these projects leaves 202 lane-miles needing rehabilitation due to studded tire damage. At $90,000 per lane mile and 202 lane-miles, there is $18.2 million worth of studded tire damage to existing concrete pavements.

CONCLUSIONS

Studded tire usage has caused at least $18.2 million damage to concrete pavements as determined by detailed rutting measurements. Damage may be similar, or much greater, for hot mix asphalt pavements, but determination of that damage will have to wait until software can be modified to perform the analysis.

Next steps:

1. Modify the INO software to allow calculation of studded tire damage to hot mix asphalt pavements. This work is underway and should be completed before the end of 2006.
2. Continue to gather annual rutting data and determine if there are trends in the accumulation of studded tire damage.
3. Locate funding sources to repair pavements damaged by studded tires.

Reprinted with permission of the Washington State Department of Transportation Materials Laboratory, July 2006. Printed without the Appendix. To view the on-line publication with Appendix, see the WSDOT website at **http://www.wsdot.wa.gov/biz/mats**

News from FHWA Washington Division

By Liana Liu, P.E., PTOE
Traffic and Safety Engineer
FHWA Washington Division

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http://www.resourceguide.its.dot.gov

2006 Excellence in Right-of-Way Awards

The Excellence in Right-of-Way Awards is a biennial awards program developed by the FHWA. The program honors those who excel in streamlining or improving the real property acquisition process while ensuring that property owners' and tenants' rights are protected. Bud Wright presented the 2006 Awards at the FHWA/AASHTO Right-of-Way and Utilities Subcommittee Annual Meeting in Baltimore, Maryland.

http://www.fhwa.dot.gov/realestate/rowea06/

Opening of First UHPC Highway Bridge in North America, May 5, Wapello County, Iowa

After five years of collaboration involving the Federal Highway Administration (FHWA), the Iowa Department of Transportation, Iowa State University/Bridge Engineering Center, and Lafarge North America, the first highway bridge in North America built with the ultra-high-performance concrete (UHPC) has been successfully completed in Wapello County, Iowa. Set to open at a May 5 ceremony, the Mars Hill Bridge features a single-span; three-beam cross section and three 110-foot girders with no mild steel shear reinforcement. The construction of this bridge was a direct result of the FHWA's UHPC research program. The UHPC offers an advanced set of properties, including exceptional durability, aesthetic flexibility, and compressive strengths up to 30,000 psi. For more information, please contact Ben Graybeal at benjamin.graybeal@fhwa.dot.gov or (202) 493-3122.

Driver Attitudes and Behaviors at Intersections and Potential Effectiveness of Engineering Countermeasures

This report describes the results of a focus group study that explored driver attitudes and behaviors at intersections to assess the likely impacts of new or existing infrastructure-based technologies/countermeasures. The focus group study is part of a larger research project that will provide FHWA with information about roadway user attitudes and behaviors at intersections. Specifically, the information concerns driving performance, perceptual and cognitive bottlenecks, constraints that can negatively impact intersection safety, and engineering or educational countermeasures for intersection safety with the greatest likely impact on performance and safety.

http://www.tfhrc.gov/safety/pubs/05078/index.htm

The Freight Peer-to-Peer (P2P) Program

The Freight Peer to Peer (P2P) Program facilitates information sharing between public sector freight transportation professionals and provides technical assistance on an as-needed basis. The Freight P2P Program is the latest addition to the ongoing FHWA Freight Professional Development (FPD) Program.

http://www.ops.fhwa.dot.gov/freight/fpd/p2p/

▲

Washington State Department of Transportation

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March 2006

researchnotes

Highway Project Delivery Requirements

Background

Delivery of a highway project in Washington State is a complex process and is dependent upon numerous entities for review, approval, cooperation, and coordination. A myriad of Federal, state, and local laws and regulations governs all aspects of project delivery–the planning process, environmental review, design, utility relocation, right-of-way acquisition, contracting, construction, maintenance, and operations. The complexity of these various regulations, and the relationship of actual legal requirements are frequently cited as causes for delays in project delivery.

What We Did

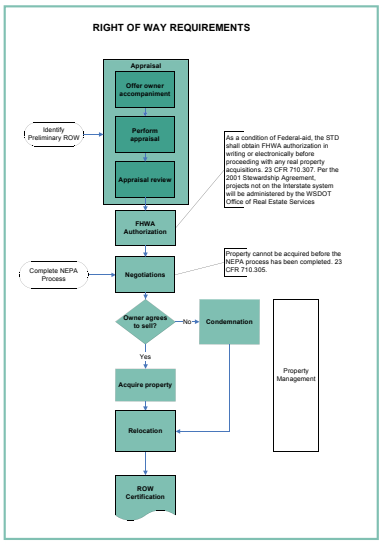
The Volpe National Transportation Systems Center (Volpe Center) worked with the Washington State Department of Transportation (WSDOT) to help make these requirements more transparent to the highway project team. The project included data gathering and documentation of WSDOT's project delivery stages, the Federal and state requirements relevant to each stage, and the roles and responsibilities of stakeholders throughout the delivery of WSDOT highway projects. During the project, researchers:

- Conducted a literature review;
- Created a spreadsheet matrix to collect and manage the requirements and related information;
- Created flowcharts to visually organize requirements;
- Validated and revised the requirements information through interviews with WSDOT staff;
- Posted the requirements information to a series of interconnected web pages.

What Did We Learn?

The goal of this project was the compilation of information, rather than the analysis of that information. The product was a web site containing information on federal and Washington state highway project delivery requirements. The compiled information is best viewed in the web site at: *www.wsdot.wa.gov/Projects/ProjectMgmt/OnLine_Guide/Proj_Legal_Requirements* so that a user can more easily link the process step in the flow chart to the detailed regulatory information found in the matrices.

Sample flow chart

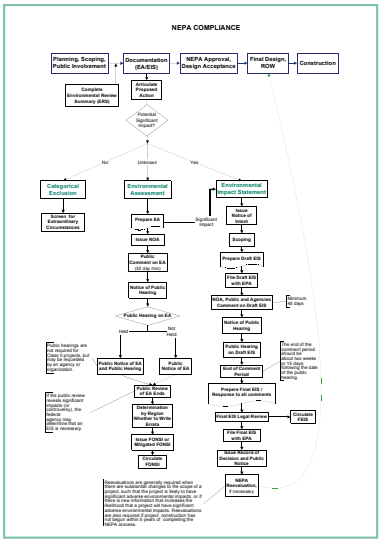


Sample matrix

Right of Way Requirements

Requirements	Description	Authority	Additional Information	MDL#
Timing: Project Agreement/FHWA Authorization	As a condition of Federal-aid, the STD shall obtain FHWA authorization in writing or electronically before proceeding with any real property acquisitions, including hardship acquisition and protective buying (see 23 CFR 710.503). The STD must prepare a project agreement in accordance with 23 CFR part 630, subpart C.	23 CRF 710.307	Per the 2001 Stewardship Agreement, projects not on the Interstate system will be administered by the WSDOT Office of Real Estate Services	
NEPA before RCW Acquisition	Acquisition of right-of-way may only commence **after** the necessary enfironmental clearances have been met.	23 CRF 710.306		

Sample flow chart



Sample matrix

NEPA Compliance

Requirements	Description	Authority	Additional Information	MDL#
NEPA Compliance	NEPA requires Federal agencies to prepare an environmental impact statement (EIS) for major Federal actions that significantly affect the quality of the human environment.	The National Environmental Policy Act (NEPA) of 1969; 40 CFR Parts 1500-1508; 23 CRF 771; 105 and 109		PE-D-06, 19
Document (EA/EIS) including Purpose and Need	Classes of Action: Categorical Exclusion, Environmental Assessment, Environmental Impact Statement	40 CFR 1502.13		

The web site contains flow charts of the regulatory requirements placed in order of common usage. In addition, dependencies between requirements (e.g., Decision A is needed before Decision B) and timing aspects (number of days allowed for a process) are included if stated in the regulation. The web site allows the user to gain an overall understanding of the process steps and to obtain detailed information on each step by clicking on the specific regulation. Hotlinks are also provided to regulatory web sites.

The draft web site was reviewed by a selected group of users. The user group commented positively on the ease of use of both the matrix and the flowcharts. The group agreed that the greatest benefit of this information would be for new staff and contracted workers to gain an understanding of project requirements.

What the Project Team Recommends

Future improvements could include links to regulation citations directly, contact information for relevant WSDOT staff, and, the inclusion of WSDOT policies and recommended practices into the flowcharts. In addition, the information can be analyzed for potential efficiencies to be gained by how decisions are sequenced or resourced.

Implementation of the Results

This information is immediately available to project engineers, specialty service providers (i.e., Real Estate Services, Environmental Services), and the public for use in understanding the overall process or as a reference tool for specific regulations at: *www.wsdot.wa.gov/Projects/ProjectMgmt/OnLine_Guide/Proj_Legal_Requirements/*.

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www.wsdot.wa.gov/Research/

Washington State Department of Transportation

Gray Notebook

The *Gray Notebook* is published quarterly by the Washington State Department of Transportation to track a variety of performance and accountability measures for review by the Transportation Commission and others.

The following is a sampling from this document. For an on-line version of this or previous editions of the *Gray Notebook*, visit http://www.wsdot.wa.gov/accountability/

Washington State
Department of Transportation

Measures, Markers and Mileposts

The Gray Notebook for the quarter ending
March 31, 2006

5 Year Anniversary Edition

WSDOT's quarterly report to the Governor and the
Washington State Transportation Commission
on transportation programs and department management

Douglas B. MacDonald
Secretary of Transportation

Cross-Cutting Management Issues

Construction Costs Trends

WSDOT prepares its construction cost estimates using historical information about market conditions drawn from recent bids. Like other state transportation departments, WSDOT must extrapolate for the future based on past records, not from a crystal ball of future market conditions. WSDOT accumulates construction cost information into a Construction Cost Index (CCI) and compares that information against the experience of other states. WSDOT's Construction Cost Index is a composite of unit price information from low bids on seven of the most commonly used construction materials. These items reflect a composite cost for a completed item of work and include the costs of labor, equipment and materials. (See the gray box to the right for more information).

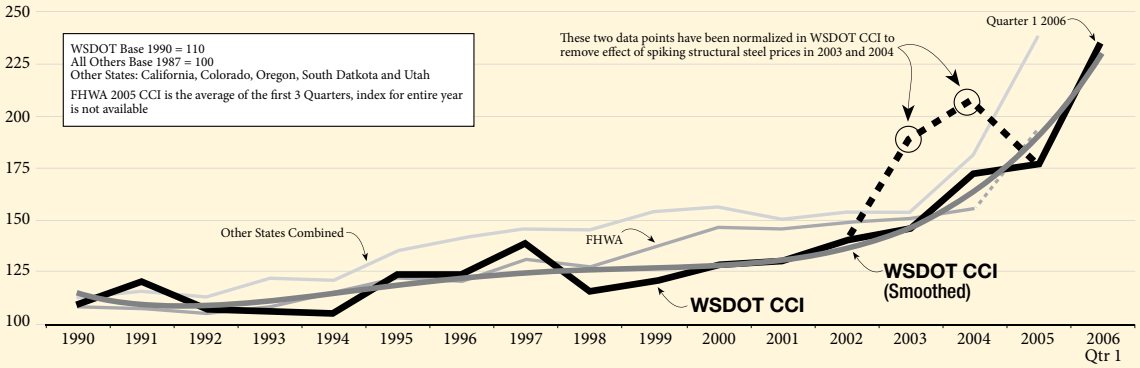
The graph below presents the past 16 years of CCI data for Washington State. This is plotted against the CCI of the Federal Highway Administration (FHWA), as well as a line representing the combined CCIs of several nearby states: California, Colorado, Oregon, South Dakota and Utah.

The following components (weighted as shown) are used to compute the CCI:

Concrete Pavement (3.2%)	Steel Reinforcing Bar (5.4%)
Crushed Surfacing (7.9%)	Structural Steel (6.9%)
Roadway Excavation (10.7%)	Hot Mix Asphalt (48.5%)
Structural Concrete (17.4%)	

For more information on what these materials are, see page 45 of the September 30, 2005 *Gray Notebook*.

Construction Cost Indices Washington State and Others



Source: WSDOT Construction Office

Construction Cost Index is up 33% for the First Quarter of 2006

WSDOT's construction cost index (CCI) has increased 33% in the first quarter of 2006 over the annual average for 2005, from 176 to 234. Of the seven materials WSDOT tracks in the CCI, Hot Mix Asphalt (HMA) comprises the majority, or 48.5%, of the index. Currently, HMA prices are up due to the rise in the cost of petroleum products. Hot Mix Asphalt costs are closely tied to oil costs: the asphalt used in HMA is made from crude oil, the machines that process the HMA run on oil and gas, and the trucks that haul and deliver the HMA require diesel.

But HMA alone does not account for the rise in the CCI, structural concrete showed an increase of 38% this quarter. The agreement this month between Mexico and the United States, wherein a duty cost of $3 per metric ton replaces the previous duty cost of $26 per metric ton, may help balance out the cost of cement over the course of 2006.

Trucks, Goods and Freight: Annual Update

Freight Mobility Supports Washington's Economy

Viable truck, goods, and freight performance data is very limited. The proprietary nature of freight data, and difficulties obtaining this data, is a national challenge. WSDOT is reporting the following indicators as a proxy for more comprehensive freight data: truck volumes on four major highways by milepost; truck registrations (p. 45); gross business revenues for freight dependent industries p. 45); international container volumes at seaports (p. 46); freight rail cargo on mainline rail (p. 46); air cargo tonnage at three major airports (p. 46); and truck border traffic at border crossings (p. 46).

WSDOT is continually seeking to enhance available freight industry performance data through research, data analysis, and collaboration between public and private industries. Although freight data remains difficult to obtain, WSDOT continues efforts to improve the performance of the freight system.

Why Is Freight Growing?

Washington's businesses and households depend on the reliable movement of goods using trucks, ships, rail, and air transportation. Across all modes and systems, freight tonnage is growing, which reflects positive economic growth and development for Washington. Based on the most recent data released by FHWA, in 2002, over 243.5 million tons of freight worth nearly $142 billion moved on Washington's freight system using truck, rail, air, ocean vessel, and inland waterways. Trucks carried most of this freight, both by tonnage (78%), and value (62%).

The growth of freight is fueled by globalization, new competitive industry trends, and technological changes. Washington is especially affected by trends international trade as it is a gateway to growing Pacific Rim and North American trade. Reduced cycle times, and shifts by manufacturers and distributors to just-in-time inventory management is also increasing freight transportation and the importance of a reliable transportation system.

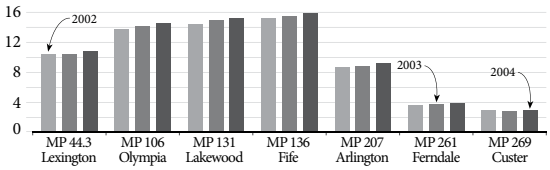
More Freight On Our Highways

Timely, reliable goods movement allows businesses to reduce manufacturing and inventory costs and to improve responsiveness to rapidly changing markets. As the demand for goods and services increases, so does the amount of truck traffic on the state's highways.

Truck volumes on four major highways in Washington show steady increases. The charts on this page show average daily truck traffic at specific mileposts on these highways. Showing truck volumes by milepost creates a unique profile by showing those locations with the greatest activity, as well as growth trends at these locations.

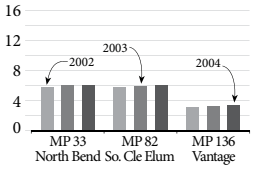
At all locations where truck data is located, there was growth in the number of trucks per day. For example, on I-5 near Olympia, annual daily truck traffic increased 5.9% from 13,800 trucks per day in 2002 to 14,518 trucks per day in 2004. On U.S. 97 near Wenatchee, the number of trucks increased 10.5% from 811 trucks per day in 2002 to 896 trucks per day in 2004.

Interstate 5 Average Daily Number of by Milepost
(South to North)



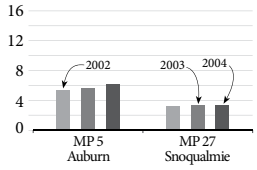
Source: WSDOT: Transportation Data Office.

Interstate 90 Average Daily Number of Trucks by Milepost
(East to West)



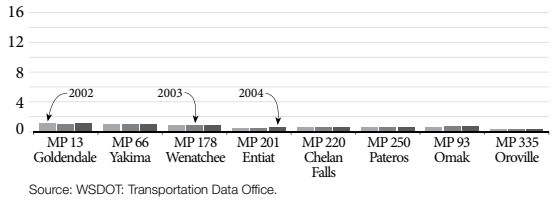
Source: WSDOT: Transportation Data Office.

SR 18 Average Daily Number of Trucks by Milepost
(South to North)



Source: WSDOT: Transportation Data Office.

U.S. 97 Average Daily Number of Trucks by Milepost
(South to North)



Source: WSDOT: Transportation Data Office.

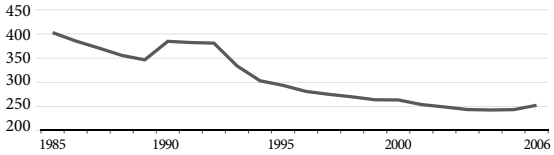
Freight and the WTP: The Washington Transportation Plan Update (WTP) covers 2007-2026 and is currently in progress. It will include a 10-year investment proposal for statewide program and state projects, as well as proposals for policies that deal with all aspects of transportation. The WTP is updated every five years and addresses nine issues, including freight movement. To access the draft WTP Update Freight White Paper, see the WSDOT Freight Office web page: www.wsdot.wa.gov/freight/default.htm

Trucks, Goods and Freight: Annual Update

Commercial Trucks Registered in Washington State

Commercial trucks operating in Washington State must register and pay state taxes. The number of trucks registered for commercial use in Washington has generally decreased since 1985, from 402,875 in 1985 to 243,124 in 2004. This decrease leveled off in 2001, with the number of trucks registered in 2001 roughly equal to the estimated number of registrants in 2006.

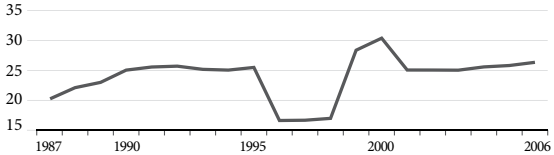
Commercial Trucks Registered in Washington
All Weight Classes: Years 1985 to 2005 and 2006 Estimate
Vehicles in Thousands



Source: WSDOT: Economic Analysis.

Trucks in interstate commerce must also register and pay state taxes based on weight and travel mileage. The number of interstate trucks prorated to Washington State shows an increase of 30% from 1987 to 2005, from an estimated 20,197 in 1987 to 25,812 in 2005.

Trucks in Interstate Use Prorated to Washington State (Estimate)
All Weight Classes: Years 1987 to 2005 and 2006 Estimate
Vehicles in Thousands



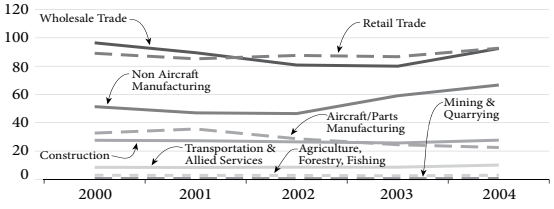
Source: WSDOT: Economic Analysis.

The number of trucks registered for use provides a limited view of trucking activity in the state. It does not reflect changes in the use and miles traveled for each individual truck.

Freight-Dependent Industries Grow 2.0%

Between 2000 and 2004, total gross business revenues for freight-dependent industries (adjusted for inflation using 2000 as the baseline year) increased by 2.0% from $309.3 billion to $315.6 billion. A slight periodic decline is seen in most freight-dependent industries during this period, reflecting a general economic downturn around 2001. However, the overall gains show these industries slowly rebounding, and in 2004 business activity surpassed 2000 levels.

Gross Business Revenues for Freight-Dependent Industries
Washington State
Dollars in Billions (Adjusted for Inflation - Base Year 2000)



Source: Department of Revenue Washington State.

Total Gross Business Revenues for Freight-Dependent Industries
Washington State
Dollars in Billions (Adjusted for Inflation to 2000 dollars)

2000	2001	2002	2003	2004	% Change 2000-2004
$309.3	$296.5	$281.9	$287.7	$315.6	2.0%

Source: Department of Revenue Washington State

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- ❑ Data Integration Primer, FHWA, 2001
- ❑ Disaster Preparedness Handbook, WA Military Dept. and WA DOH, 2005
- ❑ Dust Control on Low Volume Roads, FHWA, 2001
- ❑ Dust Palliative Selection and Application Guide, USDA, 1999
- ❑ Entering the Quiet Zone, FHWA, 2002
- ❑ Everyone is a Pedestrian, FHWA, 2001
- ❑ Family Emergency Preparedness Plan, 1999
- ❑ Fish Passage Through Culverts, FHWA, USDA, 1998
- ❑ General Field Reference Guide (Pocket Size), 2004
- ❑ Gravel Roads Maintenance and Design Manual, South Dakota LTAP, 2000
- ❑ Highway Design Handbook for Older Drivers and Pedestrians, FHWA, 2001
- ❑ Highway Finance and Public-Private Partnerships – New Approaches to Delivering Transportation Services, FHWA, 2005
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- ❑ Incident Command System for Transportation Professionals, FHWA, 2006
- ❑ Increasing Physical Activity Through Community Design, 2002
- ❑ Maintenance of Aggregate and Earth Roads, WST2 Center (1994 reprint)
- ❑ Pavement Markings, FHWA, 2002
- ❑ Pavement Preservation Checklists, FHWA, pocket guides:
  1. Crack Seal Application
  2. Chip Seal Application
  3. Thin Hot-Mix Asphalt Overlay
  4. Fog Seal Application
  5. Microsurfacing Application
  6. Joint Sealing Portland Cement Concrete Pavements
  7. Diamond Grinding of Portland Cement Concrete Pavements
  8. Dowel-Bar Retrofit for Portland Cement Concrete Pavements
  9. Partial-Depth Repair of Portland Cement Concrete Pavements
  10. Full-Depth Repair of Portland Cement Concrete Pavements
  11. Hot In-Place Asphalt Recycling Application
  12. Cold In-Place Asphalt Recycling Application
  13. Slurry Seal Application
- ❑ Pavement Surface Condition Field Rating Manual for Asphalt Pavement, NWPMA and WSDOT, 1999
- ❑ Portable Changeable Message Sign Handbook (PCMS) FHWA, 2003
- ❑ Prefabricated Bridges 2004: Good Business-Best Practice, AASHTO TIG/FHWA
- ❑ Priority Market-Ready Technologies and Innovations – 2006 List, FHWA
- ❑ PCC Pavement Smoothness, FHWA, 2002
- ❑ Reflective Sheeting Identification Guide, FHWA, 2005
- ❑ Road Sign Symbols, FHWA, 2002
- ❑ Roadway Safety Tools for Local Agencies, NCHRP, Synthesis 321, TRB, 2003
- ❑ Scenic Byways Map of Washington State, 2003
- ❑ School Administrator's Guide to School/Walk Routes and Pedestrian Safety, WTSC, 2003
- ❑ The 2001 Nisqually Earthquake – Lessons Learned, WSDOT, 2001
- ❑ Traffic Control Handbook for Mobile Operations at Night, FHWA, 2003
- ❑ Trail Construction and Maintenance Notebook, USDA Forest Service, 2004
- ❑ A Walkable Community is More Than Just Sidewalks Brochure, FHWA, 2000
- ❑ Washington Bicycle Map, WSDOT, 2001
- ❑ Washington State Highway Map, WSDOT, 2004-2005
- ❑ Wildlife Habitat Connectivity Across European Highways, FHWA, 2002
- ❑ Work Zone Traffic Control Guidelines, WSDOT, 2005

Free Videotapes

- ❑ Air Quality. Conformity in Transportation Planning, FHWA, 1999
- ❑ Danger Signs, 2004
- ❑ Driving Modern Roundabouts, City of Lacey, City of Olympia, and WSDOT, 2002

Free CD ROMs

- ❑ H&LP CD Library, 7th Edition, Summer 2005
- ❑ Bicycle Safer Journey, FHWA, 2003
- ❑ Comprehensive Intersection Resource Library, FHWA
- ❑ Context Sensitive Solutions Documents: Building Projects that Build Communities; Understanding Flexibility in Transportation Design
- ❑ Driver Education Work Zone Awareness Program, ATSSA
- ❑ Driving Modern Roundabouts, City of Lacey, City of Olympia and WSDOT, 2002
- ❑ Endangered Species Act – Build Smart, 2 CD set, FHWA, 2004
- ❑ High Performance Concrete Structural Designers' Guide, FHWA, 2005
- ❑ Inspection of Ground Anchors, FHWA, 2005
- ❑ Introduction to the Inspection of Ground Anchors and Soil Nails, FHWA, 2005
- ❑ Lightly on the Land, FHWA, 2004
- ❑ Managing Pavement Edge Drop-offs, FHWA, 2006
- ❑ Pavement Preservation Toolbox, Strategies for Preventive Maintenance Programs, FHWA, 2005
- ❑ Roundabouts: An Informational Guide, FHWA, 2000
- ❑ School Administrator's Guide to School/Walk Routes and Student Pedestrian Safety, WTSC, 2004
- ❑ Work Zone Safety for Roadway Maintenance Operations, Interactive Training Course Advanced Technology Concepts With Rutgers University
- ❑ WSDOT Engineering Publications CD Library, March 2006

Free DVDs

- ❑ Danger Signs, 2004
- ❑ Dangerous Travelers: Controlling Invasive Plants Among America's Roadways, USFS, 2006
- ❑ Driving Modern Roundabouts, City of Lacey, City of Olympia and WSDOT, 2002
- ❑ Lightly on the Land, FHWA, 2004
- ❑ Modern Roundabouts: Tomorrow's Solution for Today's Traffic, City of Bellingham, 2005
- ❑ Pedestrian Safety, City of Olympia and Washington Traffic Safety Commission, 2004
- ❑ Prefabricated Bridge Elements and Systems, AASHTO, 2005
- ❑ Road Risk, FHWA, 2005

Free Workbooks and Handouts from WST2 Center Workshops

- ❑ Construction Documentation: Construction Training Manual for Local Agencies, WSDOT, 2005
- ❑ Implementing HMA (Superpave) in Local Agencies, WSDOT and FHWA, 2005

Self-Study Guides

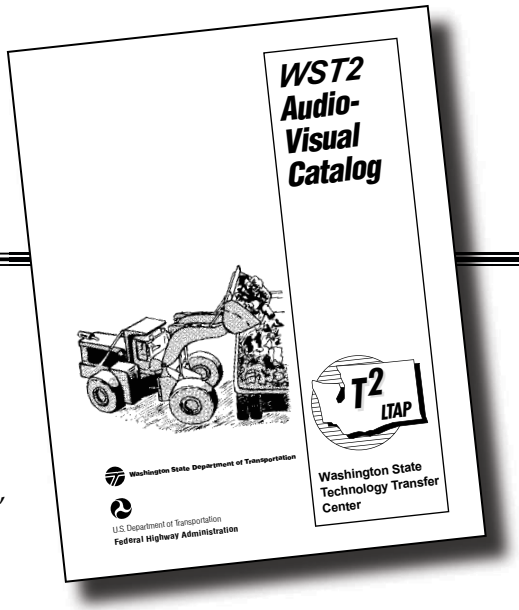
These non-credit WSDOT self-study guides may be obtained from the WST2 Center. An invoice will be sent with the books.

- Basic Surveying, $20
- Advanced Surveying (metric), $20
- Contract Plans Reading, $25
- Technical Mathematics l, $20
- Technical Mathematics ll, $20
- Basic Metric System, $20

View the entire WST2 Center's Video Lending Library online!

http://www.wsdot.wa.gov/TA/T2Center/AVC.pdf

View the list of videos in either numerical order or alphabetical. Jot down the number of the videos you wish to borrow (up to five), then call the T2 Center at (360) 705-7386 with the video numbers. They will be sent to you for three weeks!



New Items Featured in the Washington State Technology Center's Lending Library

Request by phone: (360) 705-7386 to borrow for three weeks.

Basic Traffic Control for Utility Operations – A Modular Course CD #593

Produced by: ATSSA Roadway Safety Training Institute, 2002

This CD-ROM contains essential traffic control information, based on the Manual of Uniform Traffic Control Devices, for utility workers who are working near moving traffic. Viewers will learn that temporary traffic control is the key to safe utility operations. It addresses fundamental principles of temporary traffic control, advance warning signs, retro-reflectivity, channelizing devices, typical applications, and intersections. It contains 25 True/False questions for review, and an answer key. The viewer is responsible for verifying and complying with supplemental laws adopted by his or her respective state.

NCHRP Report 525, System Security Awareness for Transportation Employees CD #594

Produced by: Transportation Research Board, National Transit Institute, 2005, 120 minutes, 6 Training Modules

Information on this awareness CD provides employees, supervisors, and managers of transportation systems with practical knowledge that will help them effectively carry out their responsibilities concerning operational and infrastructure security. It helps enhance overall crime prevention efforts and awareness of possible acts of terrorism by showing how to identify suspicious activity or objects. Contains suggestions for reporting incidents or observations.

AASHTO 2002 Roadside Design Guide 2 CD Set #595

Produced by: AASHTO, FHWA, LTAP, NHI

This CD-ROM contains Powerpoint presentations and Windows Media audio/video files. The course intends to define roadside design practices and discuss the application of the Roadside Design Guide. It covers the clear zone, drainage, sign supports, trees, barrier testing, types, warrants, and selection, bridge railings, and more.

Riparian Roads and Restoration, an Electronic Short Course about Roads and Riparian Areas CD #596

Produced by: USDA Forest Service in Partnership with the USDOT Coordinated Federal Lands Highway Technology Implementation Program, 2005

This electronic short course about roads in riparian areas addresses minimizing impacts on riparian and wetland areas and restoring or improving riparian wetland ecosystem health. Topics include soils, hydrology, aquatic species' passage at road/stream crossings, wildlife and road interactions, drainage, culverts, bridges, and The Clean Water Act. Each topic is presented by a person on the team who is an expert in that field. Most topics have multiple parts; be sure to watch them all.

On-line Resources

Bridge

- WSDOT Highways & Local Programs
  http://www.wsdot.wa.gov/TA/Operations/BRIDGE/BRIDGEHP.HTM

Environmental

- *Environmental Procedures Manual* (M31-11)
  http://www.wsdot.wa.gov/fasc/EngineeringPublications/Manuals/EPM/EPM.htm
- Regional Road Maintenance Endangered Species Act Program Guidelines
  http://www.metrokc.gov/kcdot/roads/esa/index.cfm
- National Marine Fisheries Service Species Listings and Info
  http://www.nwr.noaa.gov/
- U.S. Fish and Wildlife Service Species Listings and Info
  http://endangered.fws.gov/
- Washington State DNR's Natural Heritage Program Home Page
  http://www.dnr.wa.gov/nhp
- FHWA's Environmental Home Page
  http://www.fhwa.dot.gov/environment/index.htm

Highways & Local Programs Listservs

For the following listservs:

- Pavement Technology
- WST2 Newsletter
- WST2 Training
- Traffic Technology and Safety

Use the following address to sign up:

http://www.wsdot.wa.gov/TA/T2Center/T2hp.htm

WSDOT Materials Lab

- http://www.wsdot.wa.gov/biz/mats

WSDOT Engineering Publications On-line Orders

- http://www.wsdot.wa.gov/fasc/EngineeringPublications/order.htm

Legal Search

- Search RCWs and WACs
  http://search.leg.wa.gov/pub/textsearch/default.asp

Local Agency Guidelines (LAG) Manual

- http://www.wsdot.wa.gov/TA/Operations/LAG/LAGHP.htm

Pavement Management

- Pavement Publications and NWPMA Links
  http://www.wsdot.wa.gov/TA/T2Center/Mgt.Systems/PavementTechnology
- NWPMA – North West Pavement Management Association
  http://www.wsdot.wa.gov/TA/T2Center/Mgt.Systems/PavementTechnology/nwpma.html
- Asphalt Institute
  http://www.asphaltinstitute.org/
- National Asphalt Pavement Association
  http://www.hotmix.org/
- Pavement (A Website for Managing Pavements)
  http://www.mincad.com.au/pavenet
- FHWA Pavement Resource Site
  http://www.fhwa.dot.gov/pavement/

Project Development

- Federal Aid Progress Billing Form
  http://www.wsdot.wa.gov/TA/ProgMgt/Projectinfo/BILLFORM.XLS
- State Funded Progress Billing Form
  http://www.wsdot.wa.gov/TA/ProgMgt/Projectinfo/BILLFORMSTATE.xls
- STIP (State Transportation Improvement Program)
  http://www.wsdot.wa.gov/TA/ProgMgt/STIP/STIPHP.htm
- TIP (Local Agency 6-Year Transportation Improvement Program)
  http://www.wsdot.wa.gov/TA/ProgMgt/STIP/TIP.html

Research

- WSDOT Research Office
  http://www.wsdot.wa.gov/research
- Looking for a Transportation Research Publication?
  http://gulliver.trb.org
- Municipal Research and Services Center of Washington
  http://www.mrsc.org

Traffic and Safety

- WSDOT Traffic Data Office
  http://www.wsdot.wa.gov/mapsdata/tdo/
- Washington State Patrol
  http://www.wsp.wa.gov
- Washington Traffic Safety Commission
  http://www.wtsc.wa.gov
- National Highway Traffic Safety Administration
  http://www.nhtsa.dot.gov
- American Traffic Safety Services Association
  http://www.atssa.com
- Municipal Research and Services Center of Washington
  http://www.mrsc.org
- Transportation Research Board
  http://gulliver.trb.org

Training

- WST2 Classes
  http://www.wsdot.wa.gov/TA/T2Center/Training/
- WST2 Class Registration
  http://fmapps.wsdot.wa.gov/tbase_registration/
- County Road Administration Board
  http://www.crab.wa.gov/
- American Public Works Association
  http://www.apwa.net/education
- Transportation Partnership in Engineering Education Development (TRANSPEED)
  http://www.engr.washington.edu/epp

WSDOT Local Programs Engineers

- Eastern Region (Spokane)
  Keith Martin, (509) 324-6080,
  martink@wsdot.wa.gov
- Northwest Region (Seattle)
  Ed Conyers, (206) 440-4734,
  conyere@wsdot.wa.gov
- Olympic Region (Olympia)
  Neal Campbell, (360) 357-2666,
  campben@wsdot.wa.gov
- North Central Region (Wenatchee)
  Paul Mahre, (509) 667-3090 or 667-2900,
  mahrep@wsdot.wa.gov
- South Central Region (Yakima)
  Roger Arms, (509) 577-1780,
  armsr@wsdot.wa.gov
- Southwest Region (Vancouver)
  Leon Winger, (360) 905-2215
  wingerl@wsdot.wa.gov

Other On-line Resources

- Bicycle maps and other information
  http://www.wsdot.wa.gov/bike/
- Pedestrian information
  http://www.wsdot.wa.gov/walk/
- Rural Partnerships and scenic byways information
  http://www.wsdot.wa.gov/TA/progmgt/byways/
- Retired Professional Program
  http://www.wsdot.wa.gov/TA/T2Center/Retired.htm
- LTAP (Local Technical Assistance Program) Clearinghouse
  http://www.ltapt2.org
- Institute of Transportation Engineers
  http://www.ite.org
- Governor's Office of Indian Affairs
  http://www.goia.wa.gov
- Southwest Interagency Coop-Grounds Equipment Maintenance (GEM)
  http://www.gematwork.org

Washington State T2 Center

Contact: Laurel Gray (360) 705-7355
Wendy Schmidt (360) 705-7386
http://www.wsdot.wa.gov/TA/T2Center/Training

To register for a class in this section, use the contacts listed above.

The most up-to-date information on these courses, and a link to the on-line registration form, can be found on the website listed above.

Biological Assessment Preparation Seminar

2006: October 23-24, ½ day exam on October 25, Lacey. **$100.** WSDOT has implemented new requirements for on-call environmental consultants who prepare Biological Assessments (BAs). WSDOT's on-call consultants are required to complete this seminar and a related exam in order to qualify to write BAs for WSDOT projects. In response to this new requirement, WSDOT is offering this seminar. This new requirement will ***not*** be mandatory for local agencies who either prepare BAs or hire a consultant to prepare BAs for FHWA funded projects. However given the anticipated benefits, we encourage anyone who prepares BAs on FHWA funded projects to attend. The exam is not required for local agencies. This two-day qualification course will provide guidance for preparing Biological Assessments for WSDOT projects. Topics will include: how to organize a WSDOT BA, what to include in a WSDOT BA, the consultation process, crafting a project description, conservation measures, minimization measures, indirect and cumulative effects, defining action area, making appropriate effect determinations, and how to address stormwater and noise impacts in BAs. WSDOT completed new BA guidelines that will be presented and included in the handout materials.

Bridge Condition Inspection Update (BCIU)

2007: February 6-8, Lacey; February 20-22, Moses Lake. **Free.** Instructor: Grant Griffin, WSDOT Bridge Engineer. This course will provide information on the latest inspection manual, Laptop98 bridge inspection software, bridge file records, and other important bridge inspection issues. Sufficiency ratings and proper coding of bridge elements will also be discussed.

Bridge Condition Inspection Fundamentals (BCIF)

2007: February 13-15, Lacey. **Free to Washington State local agencies and consultants. All others $150.** Instructor: Grant Griffin, WSDOT Bridge Engineer. This course is designed to provide basic knowledge of bridge condition inspection, construction materials, material properties, bridge components and nomenclatures, loadings, stresses and strains, and deterioration of bridge materials and members. This course is preparatory for Bridge Condition Inspection Training. Graduate engineers or engineering technicians with bridge experience need not attend.

Bridge Condition Inspection Training (BCIT)

2007: March 12-23, Lacey. **Free to Washington State local agencies and consultants. All others $700.** This course is two full weeks; attendance both weeks is required. Instruction is provided by WSDOT Bridge, Highways & Local Programs, Hydraulics Section, and FHWA. This course is based on the FHWA "Bridge Inspector's Reference Manual" and will provide extensive training on the condition inspection of in-service bridges. Two comprehensive examinations will be administered: a field exam covering inspection and inventory coding, and a multiple choice classroom exam. Satisfactory completion of this course will fulfill the training requirements of the National Bridge Inspection Standards (NBIS) for a "comprehensive training course" based on the reference manual. This training is for new bridge inspectors or those who desire a refresher. Non-engineers and people with little or no bridge condition inspection experience are strongly advised to attend the Bridge Condition Inspection Fundamentals (BCIF) class prior to BCIT. Several days of instruction will be in the field.

Construction Documentation

2006: December 6, Vancouver.

2007: January 23, Lacey; January 24, Tacoma; February 27, Burlington; February 28, Bellevue; March 1, Kent; March 20, Spokane; March 21, Moses Lake; March 22, Yakima; April 17, Shoreline; April 18, Tumwater.

Free. Instructor: Ken Hash, WSDOT SW Region Assistant Local Programs Engineer. This course covers pre-contract, contract, and post-contract documentation of public works projects with FHWA funding. Local agency and contractor's documentation is discussed, with a strong emphasis on the documentation requirements of the

field inspector. On completion of this course, participants will have a working knowledge of: (1) required documentation that will be submitted by the contractor, (2) required documentation for acceptance of contract materials, (3) daily inspector's documentation of the contract work, and (4) source documentation for the monthly progress payment to the contractor. Regional Local Program Engineers will be in attendance at each class to answer questions.

Context Sensitive Solutions

2007: January 30-31, Seattle; March 6-7, Vancouver. **Free.** Instructors: John Heinley and Robert Kutrich, WSDOT. This course will provide the knowledge and skills to collaboratively develop transportation projects addressing the needs of a broad range of users and interested parties. Participants will learn to identify critical issues, involve stakeholders, evaluate alternatives and minimize tort liability when developing solutions to transportation issues that are specific to individual sites.

Contract Specification Writing

2006: September 13, Shoreline; October 19, Tumwater; November 7, Bellingham; March 7, Moses Lake. **$75.** Instructor: Steve Boesel. This class will provide guidance and methods for writing consistently clear, concise, complete and well formatted contract special provisions. It will provide a thought process that can be used when writing or reviewing contract specifications to ensure the greatest possibility for a successful bid and a successful construction project.

Cultural Resources Training

2006: October 3-6. Sessions are scheduled for May and October every year. The Dalles, OR. **$350.** Three and a half days of training. This training will introduce participants to the value and significance of Washington's irreplaceable cultural resources. The class provides an exceptional opportunity for local agencies to work with the northwest's most qualified instructors, visiting some of the area's finest examples of cultural resources and attending the only statewide training session of this caliber. For any individual who wants to become knowledgeable about cultural resources and possess the necessary skills to address basic resource management problems associated with cultural resources. Call the T2 office to have your name placed on a wait list for the next class; this course is not available for on-line registration.

Full Depth Recycling

2006: October 31, Spokane; November 1, Richland; November 28, Tumwater; November 29, Shoreline. **Free.** Instructor: Greg Halsted, Portland Cement Association. This seminar will present state-of-the-art information on Full Depth Recycling (FDR) and Cement Recycled Asphalt Base Stabilizer (CRABS) that can be utilized to save time and natural resources in the rehabilitation and reconstruction of asphalt roads. Also included will be case studies of projects that illustrate why FDR is an excellent choice for rebuilding roads. From specifications to step-by-step construction considerations, a wide range of topics regarding road reconstruction will be included in this program.

Modern Chip Seal Techniques

2007: March 27, Moses Lake; March 28, Tacoma; March 29, Kelso. **$50.** Instructor: Phil Barto, P.E., retired Spokane County Operations Engineer. This course will cover asphalt chemistry, the purpose of chip sealing, asphalt and aggregates for chip sealing, design, supervising the chip seal crews, equipment preparation, calibration and maintenance, constructing a chip seal, weather conditions, and cost management.

Preparing Your ECS for NEPA Approval

2006: September 19, Tumwater; October 10, Spokane; October 11, Ephrata; October 25, Vancouver; November 7, Shoreline. **Free.** This course will give a basic understanding of the National Environmental Policy Act (NEPA) and other environmental procedures. The course will predominantly focus on a step-by-step explanation of the Environmental Classification Summary (ECS) – the process and documentation requirements associated with each environmental consideration; the triggers for analysis; and the appropriate responses and level of documentation needed to obtain FHWA's approval. The course will also provide updates to any process, regulatory, and guidance changes that have occurred in the past year.

Purchasing, Bidding and Contract Management

2006: November 15, Lacey. **$75.** Instructor: John Carpita, Municipal Research & Services Center of Washington.

Topics:

- Purchasing and bidding overview – statutes that affect local agencies in purchasing goods, materials and services.
- Public works contracting – procedures, checklists, files; contract documents; bidding and contract award issues; contract administration and closeout; retainage and bonding; sales and use tax issues; exemptions; small works projects; emergency contracts; prevailing wage issues; contractor licensing, bond and insurance requirements.
- Consultant selection – types of consultants; quality-based selection vs. bids; selection process; contract negotiations.

Troubleshooting Roundabout Design

2006: September 19-20, Shoreline. **$250.** Instructors: Patrick McGrady and Rachel Price, Reid Middleton, Inc. Students will participate in hands-on roundabout design. Exercises include site specific conditions that influence the choice of roundabout control. Students will troubleshoot roundabout designs to identify and remove fatal flaws and refine the design for safe efficient traffic operations. Instructors will show how to establish a balance between design elements and avoid common pitfalls in single and multi-lane roundabout design that rob capacity and contribute to collisions. The class will offer roundabout plan review exercises, detailed design exercises, and cover challenges and solutions of multi-lane roundabout design. The class will also include how to assemble roundabout plans to ensure clear communication of critical dimensions and features.

WSDOT Construction and Design Courses

Free. WSDOT courses are available for public agencies and consultants acting on their behalf. Attendance is very limited. Classes are offered in Seattle, Olympia, Vancouver, Yakima, Wenatchee, and Spokane. All classes are posted on the WST2 training website as they become available and registrations are accepted online. You will find more information on our website along with descriptions for these courses. Classes will begin this fall with the Design courses scheduled for September through March, and Construction classes scheduled for January through May. The courses offered are:

- Design
  - Roadside Safety (B74)
  - Project Management Process (B71)
  - WSDOT Interchange Design (CFU)
  - Intersection and Pedestrian Design (CBD)
  - Roadway Geometric Design (BWE)
- Construction
  - Excavation and Embankments Inspection (AC3)
  - Nuclear Gauge Safety and Operation (ALG)
  - Nuclear Gauge, Embankment/Surfacing/Pavement Applications (ANQ)
  - Electrical-Illumination and Signals (API)
  - Drainage Inspection (ACF)
  - Hot Mix Asphalt Placement (ACB)
  - Bridge Structures Inspection (ACM)
  - Bridge and Structures Inspection 201 (CQ9)
  - Bituminous Surface Treatment Inspection (ACC)

TRANSPEED
University of Washington

Contact: Julie Smith
(206) 543-5539, toll free 1-866-791-1275
fax (206) 543-2352
jsmith@engr.washington.edu
http://www.engr.washington.edu/epp

To register for a class in this section, use the contact listed above.

The prices in this section are for public agency/non-public agency.

Access Management
September 19-21, 2006, Lacey. $450/$650

Technical Communication for Transportation Professionals
September 26-27, 2006, Bellevue/Seattle. $300/$500

Managing Consultants
October 3, 2006, Bellevue/Seattle; January 10, 2007, Lacey. $485/$650

Traffic Signal Timing
October 10-11, 2006, Bellevue/Seattle. $340/$540

Legal Liability for Transportation Professionals
October 11-12, 2006, Bellevue/Seattle. $305/$450

Manual on Uniform Traffic Control Devices
October 17-19, 2006, Lacey. $370/$570

Measuring Project Performance
October 24, 2006, Lacey. $470/$670

Hydrology and Basic Hydraulics
October 25-26, 2006, Bellevue/Seattle. $270/$450

Pavement Rehabilitation
October 31-November 2, 2006, Vancouver. $485/$600

Stormwater Engineering for Transportation Professionals
November 7-9, 2006, Bellevue/Seattle. $320/$470

Basic Highway Capacity Analysis for Engineers and Planners
November 14-16, 2006, Bellevue/Seattle. $400/$575

Pavement Design
December 5-7, 2006, Bellevue/Seattle. $400/$585

Fundamentals of Traffic Engineering
December 12-14, 2006, Bellevue/Seattle. $400/$575

Public Works Construction Project Management
January 8-9, 2007, Lacey. $270/$470

Roadway Geometric Design 2: Applications, Methods and Good Practice
January 16-17, 2007, Seattle. $300/$500

Construction Inspection of Public Works Projects
Date and location TBA. $370/$570

Endangered Species Act 4(d) Training Program

The Regional Road Maintenance ESA 4(d) Training Program offered by the University of Washington includes the following courses. Check their website for descriptions of courses and updates on class sessions.

http://www.engr.washington.edu/epp/esa/reginfo.html

Track 2: Introduction, Design and BMPs, Monitoring, and Environmental Roles for Engineering, Technical and Scientific Staff

Track 3: Classroom Introduction to ESA and Outcome-based Road Maintenance for Field Crews

Track 3B: Field Training for Bridge Maintenance

Track 3F : Road Maintenance Crew Training in the Field Environment: Applying Maintenance BMPs
October 23, 24, 25, 2006, Lakewood. A one-day class. $150/$300

Track 3W: BMPs for in-Water Work
September 18, 19, 20, 2006, Shelton; October 2, 3, 4, 2006, Shelton; October 10, 2006, Spokane. A one-day class. $150/$300

Track 4: Train-the Trainer for The Regional Road Maintenance Program

Other Training Programs

Engineering Professional Programs (EPP)

University of Washington, Seattle

Civil and environmental professional development, engineering review courses.

(206) 543-5539

http://www.engr.washington.edu/epp

Washington Environmental Training Center

Green River Community College, Auburn

Water, wastewater, and other courses of interest to public works departments.

1-800-562-0858

http://www.greenriver.edu/wetrc

Click, Listen and Learn

American Public Works Association

APWA's series of interactive Internet educational programs. Hear it through your speaker phone; see it on your PC. Each program is led by top experts in the field who convey new ideas, new methods, and new technologies in a two-hour time frame. Over 50 past programs can be purchased.

(816) 472-6100

http://www.apwa.net/education/cll/

Washington State Emergency Management Division

Professional Development Series courses, Advanced Professional Series courses, and courses that prepare individuals for disasters ranging from floods, fires, weather storms, earthquakes, and other natural or technological hazards.

(253) 512-7048 or (253) 512-7000

http://emd.wa.gov/

Associated General Contractors (AGC)

Erosion control and stormwater best management practices training.

(206) 284-4500

http://www.constructionfoundation.org

Homeland Security Institute

National Incident Management System on-line classes.

(360) 586-8169

http://www.hsi.wa.gov/

Washington State Department of Personnel (DOP)

Human Resource Development Services

Local agencies are invited to attend all DOP training classes. Courses on health and safety, information technology, leadership, meeting facilitation, oral and written communication, personal development, customer service, sexual harassment awareness and more.

(360) 664-1921

http://hr.dop.wa.gov/training

Evergreen Safety Council

Traffic control supervisor, traffic control flagger certification, flagger instructor, first aid/CPR, forklift instructor, safety and health training.

(206) 382-4090 or 1-800-521-0778

http://www.esc.org

Washington State Department of Labor and Industries

On-line safety courses, video library, videos on-line, workshops.

(360) 902-5800, 1-800-547-8367

http://www.lni.wa.gov/Safety/TrainTools/default.asp

Conferences

Northwest Pavement Management Association (NWPMA)

Fall Conference: September 25-28, 2006, Tacoma.

For information, contact Bob Brooks, WSDOT, at (360) 705-7352 or brookbo@@wsdot.wa.gov

American Public Works Association (APWA) Conferences

Fall 2006: October 17-20, 2006, Wenatchee Convention Center, Wenatchee. Contact Ruta Jones at (509) 664-3364.

Spring 2007: April 10-13, 2007, Paine Field Air Flight Museum, Everett. Contact David Mandyke at (509) 625-6320 or dmandyke@spokanecity.org

Fall 2007: October 9-12, 2007, The Davenport Hotel, Spokane. Contact David Mandyke at (509) 625-6320 or dmandyke@spokanecity.org

Road and Street Maintenance Supervisors' School

East Side: October 3-5, 2006, Mirabeau Park Hotel, Spokane Valley.

West Side: December 5-7, Doubletree Hotel, SeaTac.

For information, contact Michelle Johnson, Washington State University, at mlj@wsu.edu or (253) 445-4631.

Pacific Northwest Bridge Maintenance Conference

October 4-5, 2006, Seaside, Oregon.

For information, contact Washington State University at wsuconf@wsu.edu or 1-800-942-4978.

2006 Tribal/State Transportation Conference

October 25-27, 2006, Stevenson.

For information, contact Colleen Jollie at (360) 705-7025 or jolliec@wsdot.wa.gov

Infrastructure Assistance Coordinating Council (IACC)

October 31-November 2, 2006, Wenatchee.

For information, contact Bob Brooks at (360) 705-7325 or brookbo@wsdot.wa.gov

Washington Asphalt Conference

November 9, 2006, Doubletree Seattle-Southcenter, Seattle.

Links to additional information and on-line registration are at: **http://www.wsdot.wa.gov/TA/T2Center/Conf.htm**

Continued from page 5.

- Vegetation along the school walk/bike routes should be maintained to prevent encroachment and address visibility issues for smaller users. Plantings and shrubs should be no higher then three feet, or the height of the smallest pedestrian. Trees should be trimmed so that the lowest branches are at least seven feet above the sidewalk.
- Provide bicycle lanes on school bike routes for older children.
- Multi-lane roadways pose added difficulties to pedestrians and bicyclists and may require additional safety treatments like curb extensions, pedestrian lighting, signals, signage, medians, etc.
- Restrict parking within the influence area of a pedestrian crossing.
- Provide illumination along school walk/bike routes and especially at crossing locations.
- Locate vehicle drop-off facilities away from main entrances and other activity areas.
- Use traffic calming measures to help improve pedestrian safety.

More Children Walking and Biking Safely

In 2004 the Washington State Legislature allocated one million dollars to be distributed as a pilot program to eleven schools across Washington. More children walking/biking, less drop-off/pick-up traffic, fewer traffic violations, and a reduced need for school buses, are some of the successful outcomes of these projects. The Safe Routes to School Program is currently supported by both the Federal Government and Washington State Legislature through recent legislation. The Federal Transportation Act (Safe Accountable Flexible Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)) includes

a new federal funding program for the Safe Routes to School Program. The RCW 6091 also includes a state funding commitment to support pedestrian and bicycle safety projects such as safe routes to school, transit, and pedestrian and bicycle paths. Each year the program continues to grow, and more communities are working together to plan for and provide safer places for our children and ourselves. In 2006 the Safe Routes to School Call for Projects deadline is October 2, 2006.

http://www.wsdot.wa.gov/TA/ProgMgt/Grants/Safe_Routes.htm

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